SENSITIVITY ANALYSIS CAPABILITIES IN SUNDIALS [1]

Radu Serban

Center for Applied Scientific Computing
Lawrence Livermore National Laboratory
P.O. Box 808, L-560
Livermore, Ca 94551
radu@llnl.gov

The family of solvers referred to as SUNDIALS (SUite of Nonlinear, DIfferential, and ALgebraic equations Solvers) consists of solvers CVODE (for ODE systems), KINSOL (for nonlinear algebraic systems), and IDA (for differential-algebraic systems). CVODES, an extension of CVODE that provides both forward and adjoint sensitivity capabilities is available, while IDAS and KINSOLS are currently in development.

The various solvers of this family share many subordinate modules. For this reason, it is organized as a family, with a structure that exploits that sharing. All the SUNDIALS solvers share a vector module - NVECTOR - written in terms of abstract vector operations with the actual vector kernels attached by a particular implementation (such as serial or parallel/MPI) of NVECTOR.

We describe the structure and functionality of the SUNDIALS suite with emphasis on the sensitivity capabilities of CVODES and IDAS.

[1]This work was performed under the auspices of the U.S. Department of Energy by University of California, Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.